

COURSE: Prescribed Fire Planning and Implementation

TOPIC: Smoke Management (Unit 5b)

LESSON B: Quantifying and Achieving Smoke Management Objectives

**EXERCISE:** Jessie Creek Prescribed Burn (Final Exercise With Answers)

This exercise is designed to take you, the Prescribed Fire Burn Boss/Manager, through a sequence of events which led to a smoke related fatality. Read the material carefully and complete the questions which follow.

### ACTUAL SITUATION (JANUARY 14, 1982)

Wednesday, 2130 hours. A chain collision has occurred along Highway 165, 6 miles north of Pollock, Louisiana (**Figure 1**). Highway 165 is a busy, two lane interstate. The town of Pollock is rural in nature and has a population of less than 2,000 people. The next town of any size is Alexandria, Louisiana, 18 miles to the south of the accident site. The accident involves seven automobiles (two big rigs) and results in one immediate fatality and at least five others injured. According to the state trooper on the scene, the accident was caused by "near zero visibility" at the accident scene, a result of smoke from a nearby U.S. Forest Service prescribed burn.

### TWO DAYS BEFORE (JANUARY 12, 1982)

Monday - Daytime. The east side of Highway 165 was burned successfully (**Figure 1**). Topography was rolling with a maximum slope of 6%. The burn block was 220 acres. The overstory was mature longleaf pine (BA 70'/acre) with an understory of heavy brush 3-7' in height. Fuels were 6-year old leaf and needle litter.

1000 Prescription Data:

Sky	-	Clear
Temp	-	36 degrees
RH	-	32%
Wind	-	N @ 4 mph
Transport Winds	-	NE 15
Mixing Height	-	1,600 Meters

### ONE DAY BEFORE (JANUARY 13, 1982)

Tuesday - Day/Night. Smoke was not a problem during or after the burn. No smoke was reported on the highway Monday night, Tuesday or Tuesday night, even though several (15) logs and stumps were left smoldering after Monday's burn.

A burn was scheduled for Tuesday on the west side of Highway 165 but after a test fire, the predicted mixing heights and transport winds did not materialize and the burn was cancelled.

#### DAY OF ACCIDENT (JANUARY 14, 1982)

Wednesday, 0800 hours. A 343-acre prescribed fire was initiated west of Highway 165 (**Figure 1**). This fire was 1-1/2 miles west of Monday's fire. The area was similar to Monday, except there was a 1-year rough understory. The planned or prescribed and actual burning conditions can be seen as Table 1. The "predicted weather" refers to our spot weather forecast data. At least two other land management agencies were burning on the same day, within 3 miles of this project, NNE of Accident (1,800 acres total). The prescribed fire was completed at 1545. Although a few smaller interior areas remained to burn together, 85% of the area was completely burned at 1545. No mop-up was attempted. At no time during the burn was smoke reported on the highway. Three reports, including one from the air observer, indicated good smoke dispersal throughout the burn. You have made a personal check of the highway and hardwood clearcut (see **Figure 2**) and feel good about smoke dissipation at 1700 hours. At 1930 hours the highway was clear, according to a state trooper.

You are the Prescribed Burn Boss. With this in mind, answer the following:

- A. List at least five prescription parameters/weather variables using **Table 1**, Prescribed Burn Weather Summary, that contributed to this accident. Use **Table 1** to compare prescribed and actual values and/or Monday's successful prescription value to discuss variables that were missed on Wednesday's burn.

#### 50 Pts.

1. The prescribed surface wind direction promoted smoke dissipation on highway (from SE). The actual at 2100 and before was towards highway (NW-W-calm).
2. An unstable atmosphere was prescribed during the day. A stable atmosphere actually occurred, contributing to the lingering smoke effect (poor dissipation from site during day).
3. A strip head fire was prescribed and utilized. Rapid ignition would have produced less smoke (more complete combustion).
4. Wind speeds (surface) were inadequate for movement.
5. High relative humidity recovery at 1700 (58%) would suggest a high maximum RH to occur early in evening. Compare Wednesday's

1,000 RH with Monday's prescription.

6. A moderate dew presence was predicted to occur. Remember the fog-smoke combination effect.
7. Number of days since rain was adequate.
8. Inadequate mixing heights present during day and poor mixing.

B. Given your knowledge with respect to the influences of topography and physical barriers on smoke and **Figures 1 and 2**, list at least two additional contributing factors to the accident.

**20 Pts.**

1. Creek branches served to funnel heavy, downhill flow of smoke to highway. Accident occurred in drainage.
2. Cooling effect of clearcut contributed to heavy nature of smoke.
3. Large timber on east side of highway acted as a barrier, trapping smoke along highway.

C. What other general conclusions not related to weather or topography can be made with respect to why the accident occurred?

**30 Pts.**

1. Stumps/logs from Monday's burn probably contributed to overall smoke accumulations.
2. Safety should have been a major consideration along Highway 165.
3. Prescribed Burn Boss seemed to allow burn to continue despite violations in burning prescription throughout the day.
4. Prescribed Burn Boss did not allow for any drift or drainage smoke from other agency burns.

**TABLE 1**

**PRESCRIBED BURN WEATHER SUMMARY**

Burning Factor	Prescribed	Predicted	Actual			
	Weather	Weather	1030	1230	1420	1700
Surface Wind Speed Direction	6 mph SE	8 mph NW	7 mph SW	6 mph SW	8 mph W	Calm
Transport Wind Speed Direction	6 mph SE	15-20 mph W, NW	8 mph SW	10 mph W	10 mph NW	—
Relative Humidity	30%	50%	70%	65%	57%	58%
Temperature	50 <sup>o</sup>	60 <sup>o</sup>	50 <sup>o</sup>	55 <sup>o</sup>	58 <sup>o</sup>	54 <sup>o</sup>
KBDI*	15-20	37	20	20	20	20
Time to Start	1000	--	1030	--	--	--
Since Rain	1-5	--	1	1	1	1
Visibility	10-15 mi.	5-7 mi.	7 mi.	--	--	--
Mixing Height	1,000 ft.	1,000 ft.	1,000 ft.	--	--	--
Atmosphere	Unstable	Stable	Stable	--	--	--
Rate of Spread	6 ch/hr	--	--	--	--	--
Type of Fire	Strip Head	--	Strip Head	Strip Head	Strip Head	Strip Head

Burning Factor	Prescribed	Predicted	Night-Time Actual		
	Weather	Weather	1900	2000	2100
Night Predictions			Night 1900	Time 2000	Actual 2100
State of Weather		0	0	0	0
Temperature	30 <sup>o</sup>	30 <sup>o</sup>	45 <sup>o</sup>	43 <sup>o</sup>	43 <sup>o</sup>
Relative Humidity	90 <sup>%</sup>	90%	94%	95%	96%
Wind Direction	E	N	Calm	NW	W
Wind Speed	0-3	4	0	2	3

Dew	0	Moderate
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\*KBDI - Range 0-800 with 800 being least moisture content.